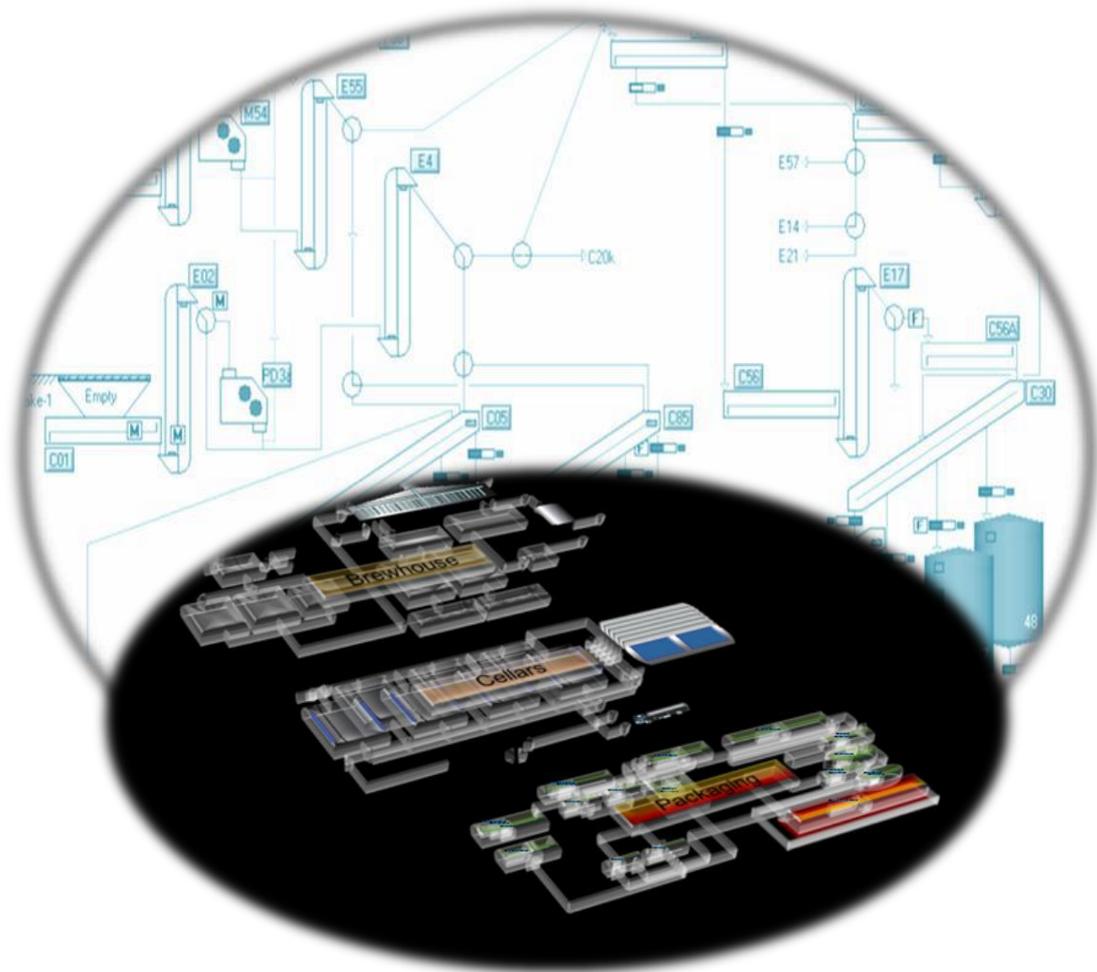


PMS Application Whitepaper: DANTE St James' Gate Brewery



Background

St. James' Gate Brewery in Dublin is the home of the Guinness Stout brand and one of the largest breweries in Europe. It was also one of the early adopters of Manufacturing Execution Systems (MES) technology. This technology supports the primary production processes in a production plant and closes the gap between ERP systems and production equipment control or SCADA applications.

A review of the existing MES system carried out in 2006 identified:

“Data models and databases are extremely powerful using base data on all aspects of brewery operations. With these models and advanced analysis tools the level of consciousness among the users and their ability to interpret this data is dramatically increased.”

3 critical aspects constrained the effectiveness of the existing system.

1. It was mounted on a single server resulting in a performance bottleneck
2. A common universal interface provided access to all data for all users with no reference to function or role.
3. The bottom up data centric design was not matched by top down performance centric functionality.

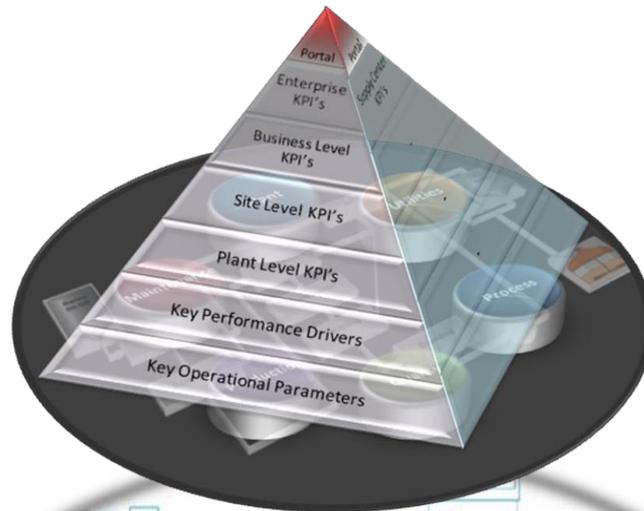
The system had become unresponsive, slow and difficult to get at data in a meaningful way. The servers became overloaded and the ongoing cost of support, maintenance and incremental development became increasingly prohibitive.

PROJECT DANTE was undertaken at the St. James's Gate Brewery to address these findings.

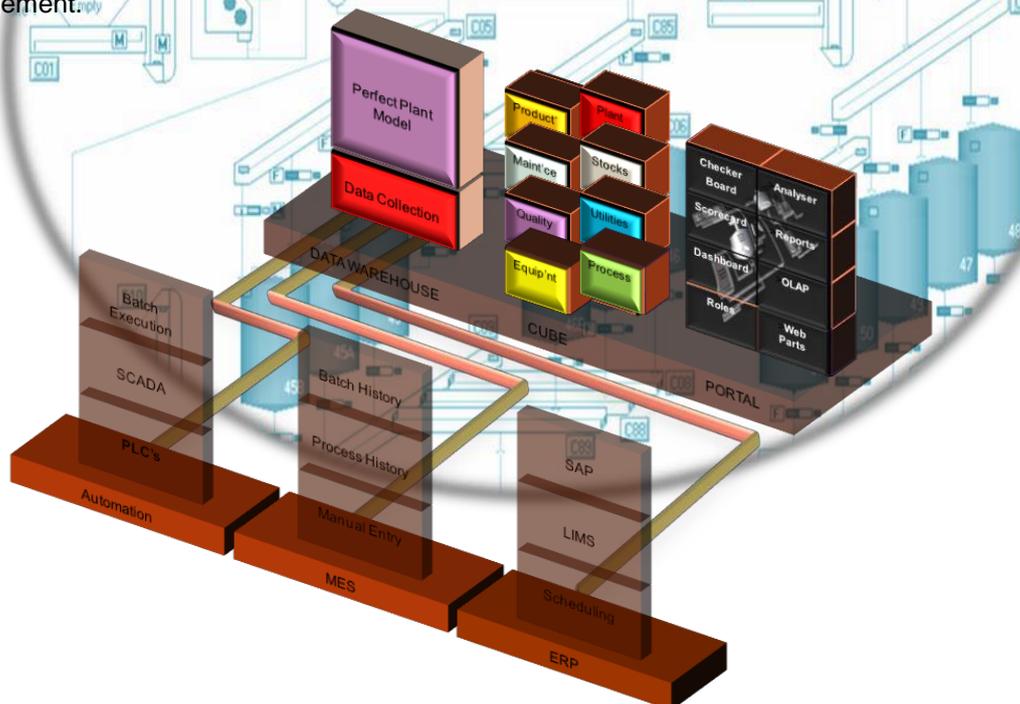
Key Objectives

- Be compatible with the SAP network environment.
- Remove boundaries that exist between the disparate systems in the brewery
- Support lean manufacturing with on-line performance management.
- Improve the accuracy and timeliness of stock reporting via a simplified SAP interface.
- Automate manual procedures associated with generating information and reports.
- Provide accurate and timely information on utilities usage and accurately track and reconcile transfers of materials between process stages thus reducing waste/losses.
- Reduce cycle times through the reduction of paperwork and manual routing by electronically capturing data from Operator entry.
- Provide the ability to do analysis of a single process step over a user-specified period of time or break down the process step data into its constituent products.
- Provide the ability to see all data pertaining to specific batch numbers and to do trend analysis within the selected batch.
- Improve throughput with better asset utilization.
- Provide improved control over process, cycle time and quality critical parameters.
- Improve customer satisfaction by providing real-time feedback to manufacturing related questions or issues.
- Reduce manufacturing costs by streamlining processes.

The MES system was re-visioned and re-engineered to become the key production system in the brewery. It operates by collecting data from multiple disparate systems (including Control, Stocks, LIMS, ERP and Utilities Systems) and consolidating this data to generate real-time performance indicators.



These indicators are weighted and consolidated to create plant and site level KPIs, which are displayed in dashboards. Performance Analytics include KPI, SPC, 6 Sigma control charts, Track & Trace functionality, Throughput, Cycle Times, O.E.E., Batch Records, Process Trends and Batch SPC. In addition to Visual Performance Management the system also provides automated recording of material movements within the brewing process, SAP Integration via SAP-MII and Operations Management.



Benefits

According to the customer the DANTE MES System:

- has enhanced manufacturing performance by providing a framework to embed ownership of key site strategies directly at the production floor. Teamwork and a culture of continuous improvement in everything Guinness do is part of the way of life for the St. James' Gate Brewery.
- plays a vital part in our continuous improvement programme. It provides the key data to improve our process capability, develop our Opex and Capex strategies, reduce our conversion costs and eliminate waste from our processes.
- provides the ability to replay historic plant operations in real time which has proven invaluable during any Root Cause Analysis. In an environment of spiraling global utilities and raw materials prices it has allowed us to achieve significant improvements in energy management, raw materials' conversion costs and waste reduction.
 - Utilities cost savings of >€2 million.
 - Raw materials cost €1.35 million ahead of budget.
 - 40% reduction in site waste MAT.

These savings have been realized through a variety of initiatives and projects, the majority of which have been developed from ideas generated by employees. The system both provides the necessary data to complete the cost benefit analysis of an initiative and the mechanism to track the benefits once implemented.

- has integrated disparate brewery systems, massively reduced run times for key production reports and has eliminated the need for manual capture of material transfer quantities. This has freed up time spent "feeding" systems and allows operators/brewers/team leaders to focus on improving the process using the output of the DANTE system.
- ensures the key process KPIs are available to all users in real-time and can be changed/edited by a super-user group using a user-friendly front-end. The Visual Performance Monitor can similarly be amended to reflect changing areas of focus for the brewery.

Team

The DANTE project was implemented as a collaboration between Guinness and Orbis MES. Orbis specializes in the development of brewery MES systems and were selected as the preferred supplier following a benchmarking visit to another Diageo site where Orbis had previously provided an MES solution.

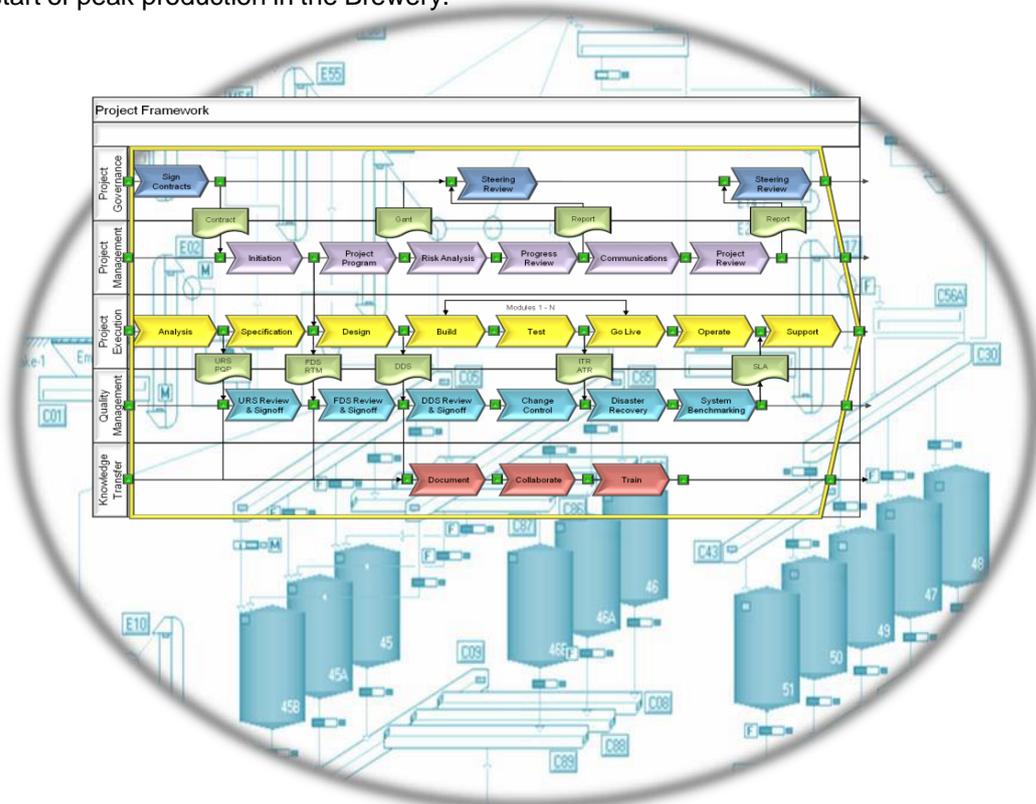
Other key partners included Computer Science Corporation who support and develop software applications applicable to the integrated production systems (quality and stock control systems) in St. James's Gate.

Approach

The project commenced with a Front End Study that looked at feasibility and business benefits. On agreement of contracts, the project commenced with User Functional Requirements Specification. A cross functional team was selected from both the Technical Support and Operations' teams in St. James' Gate Brewery to work in partnership with the Orbis personnel.

As the application of SAP-MII was new, key members of the Brewery team accompanied the Orbis team members to the United States to work in collaboration with the suppliers of the SAP-MII technology and help inform them of the requirements of a Brewing function.

The next phase was detailed design, followed by prototyping and build. Both parties agreed to very aggressive project timelines. This presented a challenge with limited resources committed to the project. The key deliverable was to guarantee supply following a go-live deadline that coincided with the start of peak production in the Brewery.



The project was implemented in its entirety on site at St. James' Gate. Full integration and acceptance testing was carried out prior to go-live in November 2007. Post go-live a number of modifications have been carried out to align the system with the business requirements.

The most notable achievement of the project was the selection of the DANTE KPI model by Diageo Plc as the basis for its new *Perfect Plant Initiative*. This initiative was to build a system that provides Diageo with the ability to gather agreed specific performance data from all their production units globally and share them openly.

Key Challenges

The project faced a number of challenges both technical and functional. It was essential that the resulting solution would deliver the type of functionality required by the business.

To ensure alignment and the success of the project it was agreed at the outset that the implementation would be conducted in its entirety on site. A site office was established and Diageo and Orbis resources worked side by side for over 6 months.

The collaborative approach was a success. In hindsight it is difficult to see how the project could have been implemented any other way.

On the technical side the volumes of data i.e. 50K I/O and the accurate tracking of material movements across the site provided particular challenges, all of which were overcome through the sustained efforts of the team.

Key Success Factors

Key to the success of the project was the huge input from all members of the team to the overall design solution. Each team member was selected because of their specific background and/or areas of expertise.

Freedom to Succeed is one of the Diageo values and the team was given this freedom on this project. They showed creativity in arriving at solutions to the many challenges this project presented.

A particularly positive team atmosphere was sustained throughout the project, through long days and nights, helped by a shared vision amongst the brewery leadership team as to what the project was setting out to achieve.

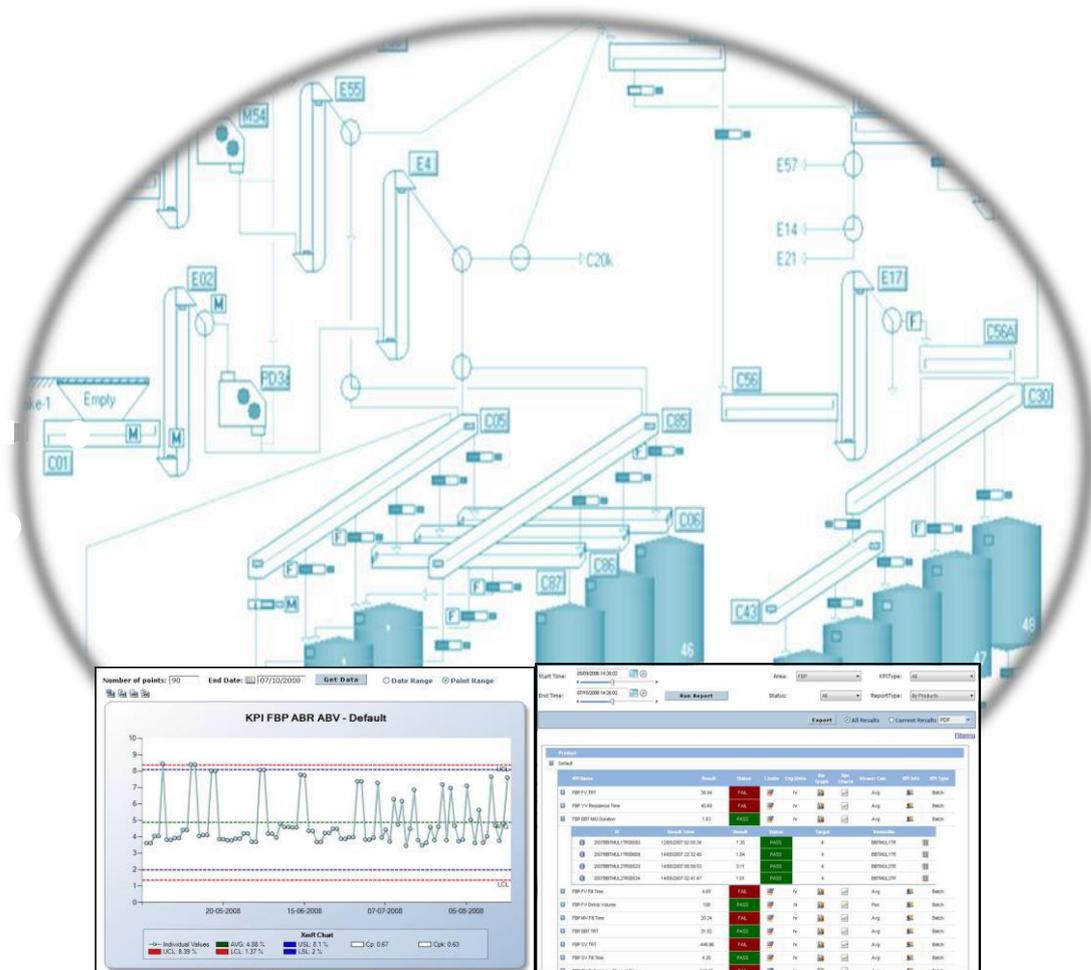
A sustained communication process helped to ease implementation when the project go-live date rolled around, as the key users were aware of the benefits the system would offer them in their daily roles and this mitigated against the obvious risks when implementing new systems in a heavily system-dependent working environment.

DANTE PMS

The DANTE system provides a blueprint for the successful integration of the shop floor and the enterprise thus increasing the agility of the Guinness Supply Chain and its ability to respond to customer demand.

Likewise the solution provides a blueprint for Manufacturing Intelligence whereby Performance Visualization and Performance Analytics are combined to enable World Class Manufacturing and a Lean Manufacturing approach at the brewery.

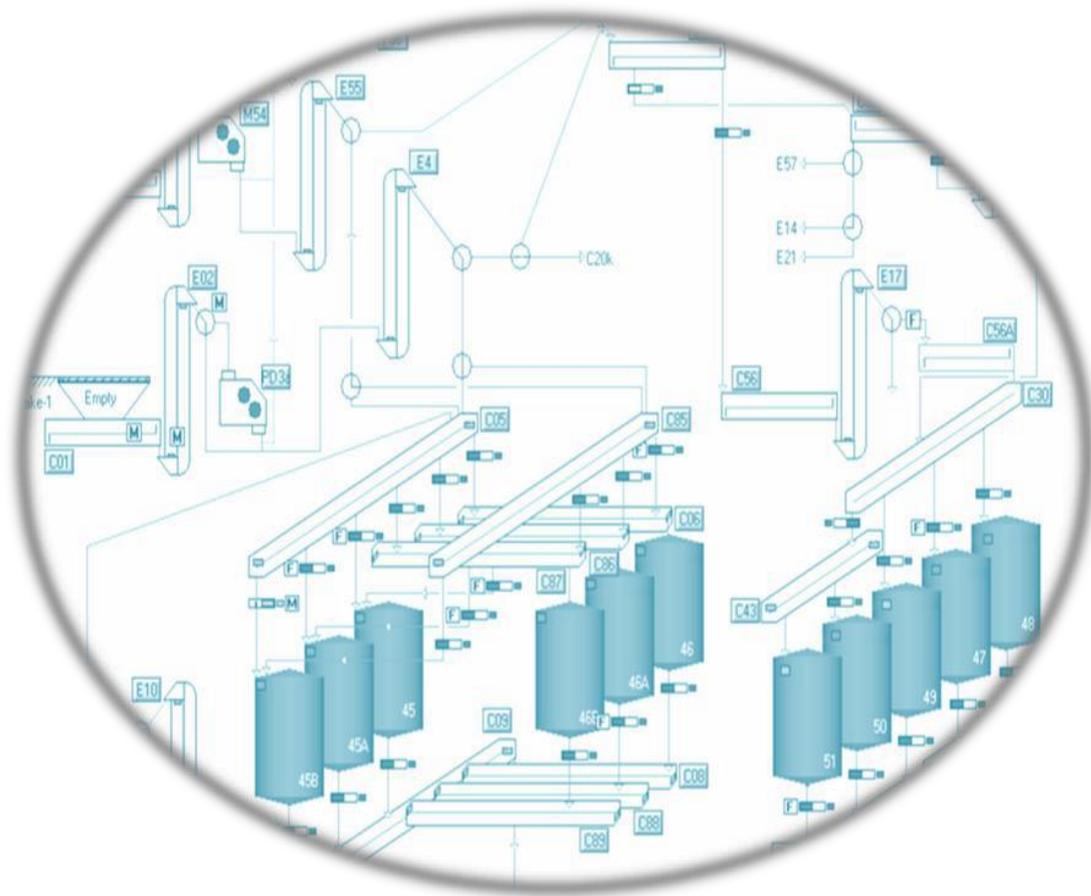
In this regard DANTE is one of the few live examples of a new genre of solution called **Performance Management System** which go beyond the traditional capabilities of Manufacturing Execution Systems and make use of new technologies including SAP MII. The Brewery has recently trained all members of the technical support team and other key users on site to 6 Sigma green belt level. The data analysis functionality provided by this project empowers them to use 6 Sigma methodologies to deliver considerable business benefits on an ongoing basis.



The system links the brewery's control system directly to SAP to enable condition and counter based monitoring of plant. This functionality will enable the automation of Preventative Maintenance Orders and has allowed the maintenance teams to move away from the traditionally time based PMOs thus prioritizing resources.

This is yet another milestone on the St. James' Gate site's journey to become world class at asset care. The project has allowed the Technical Support team to further develop the C.I. culture on site by helping to move from data centric to performance centric analysis.

Diageo believe this project puts St. James' Gate Brewery at the leading edge of MES technology; it is key to delivering their Capex, Opex and strategic objectives and places them in a good position to meet the challenges common to the brewing industry.



© 2008 Orbis MES

Orbis House, Avondale Business Park, Carysfort Avenue, Blackrock, Co Dublin, Ireland
All Rights Reserved

This document contains information of a proprietary nature.
ALL INFORMATION CONTAINED HEREIN SHALL BE KEPT IN CONFIDENCE